### VII.—LEAF GLAZE.

The disease to which we have given the above name makes its appearance in the form of grayish flattened patches on the upper surface of the leaves. These are small and often clustered at first, but soon coalesce and become of considerable size. The spots are due to the growth of a lichen (*Strigula* sp. probably *S.complanata*, Fee.), which draws no nourishment from the leaves but, like the preceding disease, must interfere in a measure with the assimilation of the plant. Many other lichens and some scale mosses (Hepaticæ) are likely to accumulate on the trunks and branches of the orange trees where there has been careless management of the groves. Their presence is a disadvantage to the tree as harboring places for vermin, but they are much less likely to have any influence over the physiological functions of the tree than the present species. We are not aware that attention has been called to this source of trouble before in relation to the orange trees nor that any methods of treatment have been recommended for arresting the growth of the lichen. Tuckerman reports this species on Magnolia, and we found it abundant on Magnolia leaves in Lake County. The spots of growth on the orange were small and immature at the time of our visit, but as the rainy season advances they are said to increase in extent and often spread over considerable portions of the leaf.

### OTHER FUNGI GROWING ON ORANGE TREES.

Only a few species of saprophytic fungi were found among the orange groves, growing on dead or dying trunks and on dead limbs and twigs. The two species of *Hypochnus*, whose systematic position is uncertain, grow on the trunks of living trees that are usually more or less covered with lichens and Hepaticæ. The following were found, some not being in a condition to be specifically identified: *Schizophyllum commune*, *Polyporus* sp., *Corticium* sp., *Hypochnus albo-cinctus*, *H. rubro-cinctus*, *Xylaria* sp., *Diatrypella citricola*, Ellis, n. sp., *Macrosporium*, sp., and some others of still more doubtful relations.

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## PEACH BLIGHT.

### *Monilia fructigena*, Persoon.

By Erwin F. Smith.

(Plates V and VI.)

This note is for the purpose of calling renewed attention to the destructive action of *Monilia fructigena* upon the branches of the peach. It will serve to record some new facts and to correct one or two assumptions which found their way into a previous paper * without sufficient warrant.

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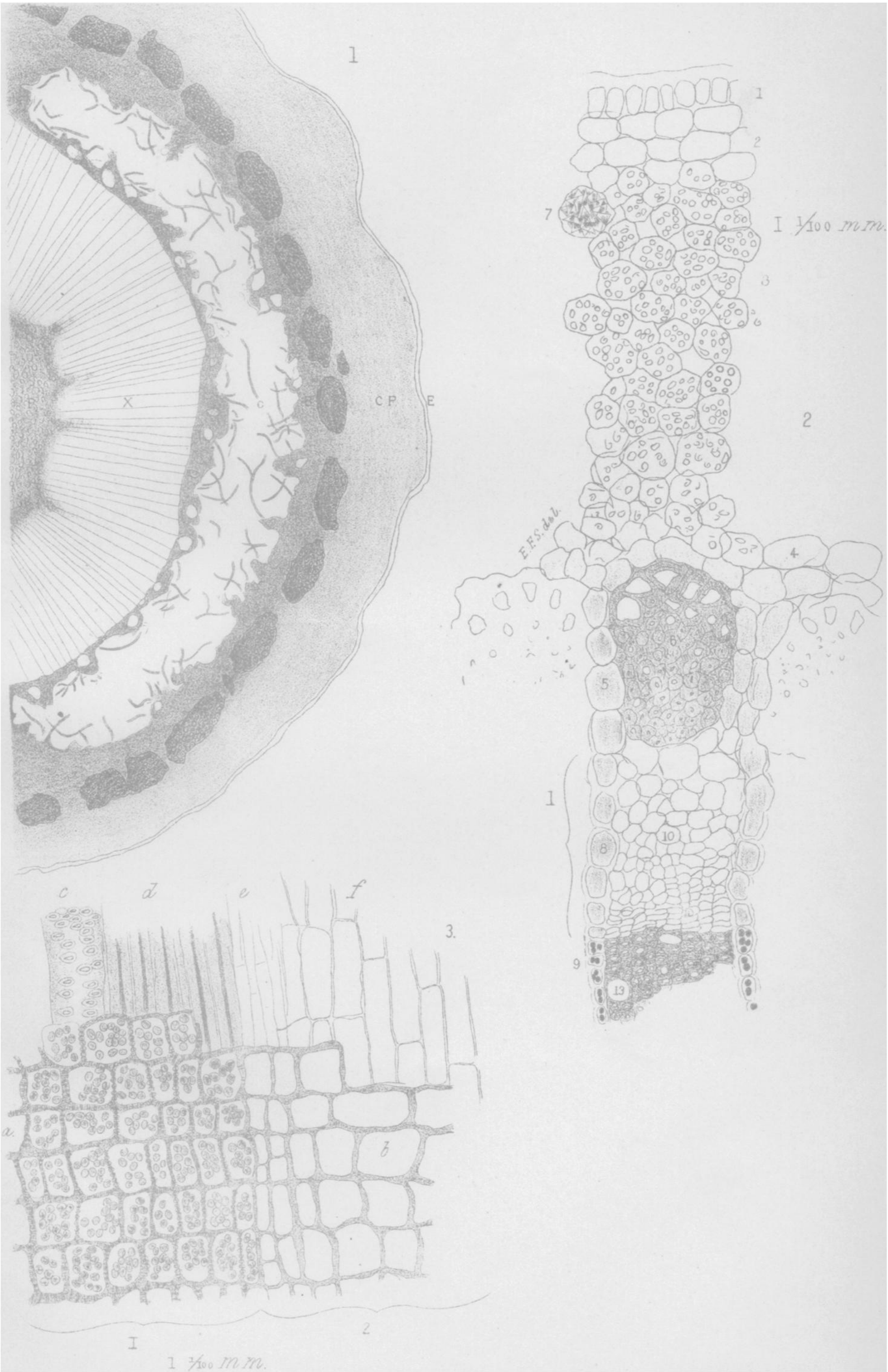
SMITH ON MONILIA FRUCTIGENA.




SMITH ON MONILIA FRUCTIGENA.

The vitality of the conidia is much greater than I had supposed. In one instance roll cultures from dry material a year old gave results, although only a portion of the conidia germinated. Spores from other samples failed to grow. More tests will have to be made before we have anything like an accurate measure of the vitality of the conidia, but it is probable that these alone are sufficient to tide the fungus over winter. There is, however, no question as to the existence of a resting mycelium within the mummified fruits. The sudden general appearance of the blight on the Delaware and Chesapeake peninsula this spring is a matter of special interest in connection with the fact that there was no twig-blight and no rot of the fruit in 1890. There was no fruit which could rot, owing to the destruction of the entire crop by spring frosts; and being in the orchards much of my time from April to November, I did not observe a single blighted twig, although anxious to collect it.

In the spring of 1891 the blight of the twigs of the peach was a common occurrence on the upper part of the peninsula, *i. e.*, in five or six counties. It attracted general attention and in Sussex County, where it was most injurious, it was named "the scald," and was very generally ascribed to the heat of the sun. In Maryland it was attributed to frosts.

Observations in many orchards showed that it appeared immediately after rain during the time of flowering, and that it penetrated *exclusively through the blossoms.* Heretofore I had supposed it capable of penetrating through the unbroken cuticle of young shoots, but such cases must be exceptional. An examination of hundreds of twigs in all stages of blight showed that every one was associated with blighted and persistent flowers. In a majority of cases the entire twig was killed, *i. e.*, the distal end beyond the point of entrance (Plate V, Fig. 1). The extremities of the twigs blighted either under the direct action of the mycelium or simply from arrested nutrition due to injuries farther down the stem. It was not difficult, however, to find cases (Plate V, Fig. 2) where only one blossom and a small portion of the adjacent stem was affected, the parts above and below remaining intact. The uniform persistence of the blossoms and the size of the twisted, withered leaves (Fig. 1) showed very clearly for many days that all the injury was done at one time. Some weeks later, under the influence of warm weather, many restricted blight spots, as in Fig. 2, took a new growth, girdling stems and wilting good-sized green leaves and fruits, but I looked in vain for new infections.

For 3 weeks following blooming the weather was dry and the blight was restricted almost wholly to stems of last year's growth. But I found a number of stems in which it had involved the growth of 1889, and saw enough to convince me that with wet weather and high temperature such cases would have been as common as in the summer of 1887, when the fungus entered the stems, by way of the rotting fruits.*

* This method of penetration was also common in Maryland and Delaware in the *summer* of 1891, and early varieties blighted almost as badly as in 1887.

The dry weather also almost wholly prevented the fruiting of the fungus. Out of many hundred stems examined for spore tufts, during a period of 3 weeks following blossoming, I found only half a dozen. However, a microscopic examination showed the presence of mycelial threads in the tissues, and upon placing freshly gathered twigs in moist air for 12 hours many of them sent out the characteristic spore tufts of *Monilia fructigena*. By continuing this treatment another 12 hours spore tufts pushed through the unbroken bark on about 75 per cent of the stems. This experiment was repeated some days later with similar results, but a third experiment, using twigs which had been picked 4 or 5 days and were somewhat dry, gave only 2 per cent with *Monilia* tufts at the end of 24 hours. Plate V, Fig. 3, gives an enlarged view of a twig bearing fruiting tufts after 12 hours in moist air. Fig. 4 shows a conidiophore and conidia from the same.

The extrusion of gum from the vicinity of the blighted flowers was quite common (Plate V, Figs. 1*g* and 2*g*). On cutting through the bark of such twigs the vicinity of the cambium cylinder was invariably gummy, but this was less noticeable on dry twigs.

Carefully made cross sections of freshly blighted twigs were submitted to microscopic examination. The cambium and soft bast cylinders had disappeared almost completely with the formation of extensive gum pockets (Plate VI, Fig. 1). These pockets were full of the active mycelium of *Monilia*. This also penetrated into the cortical parenchyma to some extent, and to a lesser degree into the xylem. Practically speaking, the wood and pith and all of the cylinders external to the soft bast were intact. On unmagnified cross sections a zone of discoloration was visible between the wood and the bark. On magnification this was found to consist, as shown in Plate VI, Fig. 1, of a gum cavity containing mycelium and fragments of tissue and bordered by irregular dark zones, the one within composed of young wood and vessels laid down this spring, and the one without composed of remnants of soft bast and phlœm rays. The bundles of bast fibers were also changed from a glistening white to a dirty yellowish brown. Plate V, Figs. 5, 6, and 7, show mycelial threads from these cavities. It was easy to find threads overlying and interwoven with tissue. Plate VI, Fig. 2 represents the appearance of the destroyed tissues on a normal cross section; fig. 3 represents the same on a longitudinal radial section.

## DESCRIPTION OF PLATES.

### Plate V.—(*Monilia fructigena.*)

Fig. 1. Blighted peach stem, showing dead persistent, flowers and leaves; *g*, gum exuded near union of blighted and living portion; *w*, stem of two year's growth. Collected some days after the entrance of the fungus.

2. Peach stem collected same day as Fig. 1; *a*, withered persistent flower through which the mycelium entered the stem; *bb*, restricted area of blight, the distal end of the stem being still connected by a narrow isthmus of sound tissue with the parts below; *g*, drop of exuded gum.

3. Enlarged end of blighted stem showing conidia tufts which pushed through the bark on exposure to moist air.

4. Conidiophore and conidia from one of the tufts shown in Fig. 3.

5, 6, 7. Mycelial threads from the gum cavities of the inner bark. (See Plate VI, Fig. 1.)

### Plate VI.—(*Monilia fructigena*).

Fig. 1. Cross-section of a blighted peach stem, such as Fig. 1 of Plate V, showing a large gum cavity full of active mycelium; *p*. pith; *x*, xylem; *c*, cavity containing remnants of cambium and soft bast and hyphæ; *b*, bast bundles, *cp*, cortical parenchyma; *e*, epidermis. On the opposite side of this stem was a cavity larger than that here shown.

2. Enlarged cross-section of portion of a normal peach stem one year old, for comparison with Fig. 1. The portion destroyed is that included in the brace; (1) Epidermis; (2) subepidermal cells, usually destitute of chlorophyll, but containing coloring matters in solution, *e. g.*, reds or browns; (3) chlorophyll bearing cortical parenchyma; (4) expansion of phloem ray cells; (5) phloem ray cells separating bast bundles; (6) bast bundle—outlines of two others are indicated; (7) large cell containing a crystal of calcium oxalate; (8) phloem ray cells separating the soft bast (4, 5, and 8, destitute of starch); (9) xylem ray cells full of starch; (10) soft bast; (11) cambium; (12) xylem fibers; (13) vessels in the xylem.

3. Longitudinal radial section along the medullary ray of a stem similar to the inner part of Fig. 2, showing wood, cambium, and soft bast with an overlying portion of the ray. *a*, Cells of xylem ray gorged with starch; *b*, cells of phloem ray destitute of starch; *c*, pitted vessel; *d*, wood fibers; *e*, cambium cells; *f*, soft bast. The left part (1) is xylem; the right (2) is the inner part of the phloem, and is the portion destroyed by the Monilia. Sections from which Figs. 2 and 3 were drawn were cut from fresh material at the end of the growing season (November 1).

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## THE IMPROVED JAPY KNAPSACK SPRAYER.

By B. T. Galloway.

(Plates VII–IX.)

Something over three years ago the Japy brothers of Beaucourt, France, designed a knapsack sprayer, which is commended by every one who has used it, for its simplicity, durability and effectiveness. This machine is used largely throughout the vine-growing region of France and a few have been imported into this country. Recently a number of improvements have been made in the sprayer which make it even more valuable, placing it, in fact, in the front rank of machines of this description. For the benefit of American small fruit and vegetable